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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/928,221	08/10/2001	J.J. Garcia-Luna-Aceves	UC2000-360-2	7500

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EXAMINER

ROBERTS, BRIAN S

ART UNIT	PAPER NUMBER
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2662

DATE MAILED: 04/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. K	Applicant(s)	
	09/928,221	GARCIA-LUNA-ACEVES ET AL.	
	Examiner Brian Roberts	Art Unit 2662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 10 August 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-7, 9-13, 15-21, 23-27 is/are rejected.
- 7) ☒ Claim(s) 5, 8, 14 and 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/21/2002</u> . | 6) <input type="checkbox"/> Other: _____ |

Claims 1-27 have been examined

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1, 3, 6, 9-11, 15-18, 21, 23, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over *MACA-BI (MACA by Invitation) A Receiver Oriented Access Protocol for Wireless Multihop Networks* by Talucci et al. in view of Redi.

- In reference to claim 1

Talucci et al. teaches in Figure 2 and 3 a receiver oriented MAC protocol for a wireless network comprising of:

- Node B sending a RTR signal to a plurality of Nodes including Node A
- A first collision-avoidance delay as shown in Figure 2(b).
- Node A transmitting data to Node B

Talucci does not teach canceling transmission of the data packet during the first collision-avoidance delay interval in response to receipt of a no-transmission-request control packet.

Redi teaches in Figure 5 a wireless network with:

- A receiver node (125) transmitting a Not-Clear-to-Send (NCTS) control packet (column 6 lines 16-41) (column 4 lines 38-50)

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the protocol as taught by Talucci et al. et al. to include the NCTS control packets as taught by Redi because the NCTS control packets prevent multiple nodes from sending data packets to a node that transmitted a RTR signal and that is already busy receiving data packets from a node thus preventing data packet collisions.

- In reference to claim 3, 6

Talucci et al. teaches a receiver oriented MAC protocol that covers substantially all limitations of the claim.

Talucci et al. does not teach a clear-to send control packet from the first node indicating that the second node is clear to send the data, followed by a second collision-avoidance-interval, or canceling transmission of the data packet in response to receipt of a no-transmission-request control packet

Redi teaches in Figure 5 a wireless network with:

- A receiver node (125) transmitting a Not-Clear-to-Send (NCTS) control packet causing node (130) to cancel transmission (column 6 lines 16-41) (column 4 lines 38-50)
- The use of a clear-to-send control packet indicating that the second node (130) is clear to send data to the first node (125) followed by a second collision-avoidance interval.
- The second node (130) transmitting the data packet to the first node (125) unless a NCTS control packet is received

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the protocol as taught by Talucci et al. to include the first node sending a CTS control packet to the second node after the first node is no longer busy as taught by Redi in order for the second node to transmit the data packet to the first node that were delayed upon receipt of a NCTS control packet.

- In reference to claim 9, 15

Talucci et al. teaches a receiver oriented MAC protocol that covers substantially all limitations of the parent claims.

Talucci et al. teaches in Figure 2 and 3 a MAC protocol for a wireless network in an environment where hidden terminal conditions are predominant. (Abstract)

- In reference to claims 10, 16, 24

Talucci et al. teaches a receiver oriented MAC protocol that covers substantially all limitations of the parent claims.

Talucci et al. further teaches that the nodes in the wireless network prevent collision by sensing the carrier within the channel (Section I)

- In reference to claim 11

Talucci et al. teaches in Figure 2 and 3 a receiver oriented MAC protocol for a wireless network comprising of:

- Node B sending a RTR signal to a plurality of Nodes including Node A

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- A first collision-avoidance delay as shown in Figure 2(b).
- Node A transmitting data to Node B

Talucci et al. does not teach a clear-to send control packet from the first node indicating that the second node is clear to send the data, followed by a second collision-avoidance-interval, or canceling transmission of the data packet to receipt of a no-transmission-request control packet.

Redi teaches in Figure 5

- Node (125) transmitting a Not-Clear-to-Send (NCTS) control packet to node (130)(column 6 lines 16-41) when it is busy and unable to receive any more data packets. (column 4 lines 38-50)
- Node (125) transmitting a Clear-to-Send (CTS) control packet, followed by a second interval

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the protocol as taught by Talucci et al. to include the first node sending a CTS control packet to the second node after the first node is no longer busy as taught by Redi in order for the second node to transmit the data packet to the first node that were delayed upon receipt of a NCTS control packet.

- In reference to claims 17, 21

Talucci et al. teaches in Figure 2 and 3 a receiver oriented MAC protocol for a wireless network comprising of:

- Node B transmitting a RTR signal to a plurality of Nodes including Node A

- Node A being ready to receiver-initiated transmission request from Node B
- Node A receiving the RTR control packet from Node B after a first collision-avoidance delay as shown in Figure 2(b).
- Node A transmitting data to Node B

Talucci et al. does not teach monitoring for a NTR control packet or canceling transmission of the data packet when a NTR control packet is received.

Redi teaches in Figure 5

- Node (130) monitoring for a NCTS from Node (125)
- Node (125) transmitting a Not-Clear-to-Send (NCTS) control packet to node (130)(column 6 lines 16-41) when it is busy and unable to receive any more data packets. (column 4 lines 38-50)
- The NCTS control packet meaning to cancel transmission of the data packet
- Node (130) canceling the transmission of the data packet to Node (125)

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the protocol as taught by Talucci et al. to include the NCTS control packets and the nodes monitoring for an NCTS as taught by Redi because the NCTS control packets prevent multiple nodes from sending data packets to a node that transmitted a RTR signal and that is already busy receiving data packets from a node thus preventing data packet collisions

- In reference to claim 18

Talucci et al. teaches a receiver oriented MAC protocol that covers substantially all limitations of the parent claims.

Talucci et al. further teaches that the nodes in the wireless network adapted for detecting carrier within the channel (Section I)

Talucci et al. does not explicitly teach the nodes comprising of single-channel radios having carrier sense capability.

Redi teaches in Figure 1 a method and system of collision avoidance in a multi-hop packet radio network.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the nodes as taught by Talucci et al. to comprise of single channel radios as taught by Redi because a network comprising of single channel radios is a wireless network and would be a potential application environment for the protocol.

- In reference to claim 23

Talucci et al. teaches in Figure 2 and 3 a receiver oriented MAC protocol for a wireless network comprising of:

- Node B sending a RTR signal to a plurality of Nodes including Node A

Talucci et al. does not teach canceling transmission of the data packet during the first collision-avoidance delay interval in response to receipt of a no-transmission-request control packet.

Redi teaches in Figure 5

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- Node (125) transmitting a Not-Clear-to-Send (NCTS) control packet to node (130)(column 6 lines 16-41) when it is busy and unable to receive any more data packets. (column 4 lines 38-50)
- Node (130) receiving the NCTS control packet meaning to postpone transmission of the data packet
- Node (130) transmitting the data packet to Node (125)

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the protocol as taught by Talucci et al. to include the NCTS control packets as taught by Redi because the NCTS control packets prevent multiple nodes from sending data packets to a node that transmitted a RTR signal and that is already busy receiving data packets from a node thus preventing data packet collisions.

Claim 2, 4, 7, 12, 13, 20, 25, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over *MACA-BI (MACA by Invitation) A Receiver Oriented Access Protocol for Wireless Multihop Networks* by Talucci et al. et al. in view of Redi, as applied to the claims above, and further in view of *Poll-before-Data Multiple Access* by Tzamaloukas et al.

- In reference to claims 2, 12, 19, 26

The combination of Talucci et al. and Redi teach a system that covers all limitations of the parent claims.

Talucci et al. and Redi do not explicitly teach the first collision-avoidance delay interval set to at least the maximum propagation delay between the nodes communicating over the channel.

Tzamaloukas et al. teaches a multiple access control protocol where the collision-avoidance delay interval is at least greater than twice the maximum channel propagation delay. (Section II paragraph 2, Section 3)

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the receiver oriented MAC protocol as taught by the combination of Talucci et al. and Redi to include the collision-avoidance delay interval being greater than twice the maximum channel propagation delay as taught by Tzamaloukas et al. in order to prevent collision between packets.

- In reference to claim 4, 7, 13

The combination of Talucci et al. and Redi teach a system that covers all limitations of the parent claims.

Talucci et al. and Redi do not explicitly teach the clear-to-send packet being of sufficient length that transmission thereof requires a length of time which exceeds the time for transmitting a ready by twice the maximum propagation delay between the nodes communicating over the channel.

Tzamaloukas et al. teaches a multiple access control protocol where the collision-avoidance delay interval is at least greater than twice the maximum channel propagation delay. (Section II paragraph 2, Section 3)

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the receiver oriented MAC protocol as taught by the combination of Talucci et al. and Redi to include the control packet length as taught by Tzamaloukas et al. in order to prevent collision between packets.

- In reference to claim 20

The combination of Talucci et al. and Redi teach a system that covers all limitations of the parent claims.

Talucci et al. and Redi do not teach a protocol involving transmitting a CTS control packet by the second node, if the second node has no data packets for transmitting to the first node and transmitting data from the first node to the second node after receiving the CTS control packet.

Tzamaloukas et al. teaches a method where:

- The receiver node sends a ready-to-receive-and transmit (RT2) packet where the sender is enabled to send a data packet, if it has one; otherwise, if the sender is quiet, the receiver sends a clear-to-send (CTS) packet, enabling the sender of the RT2 to send its own data packet free of collisions.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the receiver oriented MAC protocol as taught by the combination of Talucci et al. and Redi to include the second node being able to send data packets to the first node when the first node does not have any packets to send to the second

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node as taught by Tzamaloukas et al. it reduces the signaling overhead and increase the data transfer rate of the wireless network.

- In reference to claim 25

Talucci et al. teaches in Figure 2 and 3 a receiver oriented MAC protocol for a wireless network comprising of:

- Node B sending a RTR signal to a plurality of Nodes including Node A
- Node A receiving the RTR control packet
- Entering a first collision-avoidance delay as shown in Figure 2(b).
- Backing-off of the channel by a third node
- Node A only transmitting a data packet to Node B if it is addressed to Node B
- Node A transmitting to Node B upon receipt of a RTR control packet and the availability of a data packet to be transmitted

Talucci et al. does not teach monitoring for ongoing transmissions with other nodes or postponing transmission of the data packet when a NTR control packet is received.

Redi teaches in Figure 5

- Node (125) monitoring for ongoing transmissions with other nodes
- Node (125) transmitting a Not-Clear-to-Send (NCTS) control packet to node (130)(column 6 lines 16-41) when it is busy and unable to receive any more data packets. (column 4 lines 38-50)

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- Node (130) postponing transmitting of the data packet to Node (125) upon receipt of a NCTS control packet.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the protocol as taught by Talucci et al. to include the node monitoring for ongoing transmission from other nodes and sending a NCTS control packet if detecting any channel activity as taught by Redi because the NCTS control packets prevent multiple nodes from sending data packets to a node that transmitted a RTR signal and that are already busy receiving data packets from a node thus preventing data packet collisions

Claim 27 rejected under 35 U.S.C. 103(a) as being unpatentable over *Poll-before-Data Multiple Access* by Tzamaloukas et al. in view of Redi.

- In reference to claim 27

Tzamaloukas et al. teaches in Figure 1 a method where:

- Entering a PASSIVE state when there are no transmission and no carrier is sensed
- Transitioning REMOTE state when a carrier is detected and to defer to ongoing transmissions.
- The REMOTE state allows for enough time for a complete successful handshake to take place
- Transitioning from a PASSIVE state to a BACKOFF state if noise is detected on the channel

- The BACKOFF state allows for enough time for a complete successful handshake to take place
- Transitioning to a RT2 state if the node obtains an outgoing packet to send to a neighbor node
- The node transmitting the RT2 control packet
- Receiving the RT2 control packet by the neighboring node
- Waiting for a time period upon receipt of the RT2 control packet by the neighboring node
- Transitioning to the BACKOFF state for a given period of time
- Transitions to the XMIT state after the waiting period
- Transmitting a data packet from the neighboring node to the node

Talucci et al. does not teach canceling transmission of the data packet during the first collision-avoidance delay interval in response to receipt of a no-transmission-request control packet, transmitting a ACK control packet upon receipt of the data packet, or transitioning to the BACKOFF state once a ACK control packet is not received from the first node within a sufficient interval.

Redi teaches in Figure 5:

- Node (125) transmitting a Not-Clear-to-Send (NCTS) control packet to node (130)(column 6 lines 16-41) when it is busy and unable to receive any more data packets. (column 4 lines 38-50)
- Node (125) sending an ACK (550) control packet on receipt of the data packet to Node (130)

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the protocol as taught by Tzamaloukas et al. to protocol as taught by Redi because:

- The NCTS control packets prevent multiple nodes from sending data packets to a node that transmitted a RTR signal and that are already busy receiving data packets from a node thus preventing data packet collisions;
- The ACK control packet confirms receipt of the data packet and ends the data transfer process.

Allowable Subject Matter

Claims 5, 8, 14, 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 5, 8, 14, 22 contain allowable subject matter because the prior record fails to teach or fairly suggest a method of providing a MAC protocol in a wireless network having a plurality of nodes comprising of transmitting a data packet over a channel by the first node, after a first collision-avoidance delay interval, in response to receipt of a no-transmission-request control packet from a second node indicating that the second node is ready to receive a data packet; and canceling transmission of the data packet during the first collision-avoidance delay interval in response to receipt of a no-transmission-request control packet which indicates the detection of activity within the channel; wherein the ready-to receive control packet further indicates that the

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second node is requesting transmission data to the first node; and wherein transmission of the first node is responsive to the receipt of a clear-to-send control packet from the first node indicating that the second node is clear to send the data packet; and wherein the second collision-avoidance interval substantially equals or exceeds the time required for transmitting a ready-to-receive control packet plus seven times the maximum propagation delay between the nodes communicating over the channel.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure are:

- Chen et al. (US 5502724) teaches a communication medium access control protocol for wireless communication.
- Negus (US 2001/0055312 A1) teaches a wireless communication system protocol Medium Access Control layer.
- McKay et al. (US 5844905) teaches a medium access control protocol with collision avoidance.
- *MACA-BI (MACA by Invitation) a wireless MAC protocol for high speed ad hoc networking* by Talucci et al. teaches a communication medium access control protocol for ad hoc wireless networks with hidden channels.
- *Complete single-channel solutions to hidden terminal problems in wireless LANs* by Fullmer et al. teaches a solution to the hidden terminal problems in wireless LANs.


- *Performance of the Floor Acquisition Multiple Access in ad-hoc networks* by Garcia-Luna-Aceves et al. teaches a protocol where a station must acquire the floor before transmitting one or more packets.
- *Channel-hopping multiple access* by Tzamaloukas et al. teaches a medium-access control protocol based on collision avoidance in a wireless network with hidden terminals.
- *Solutions to hidden terminal problems in wireless networks* by Fullmer et al. teaches the floor acquisition multiple access discipline in networks with hidden terminals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Roberts whose telephone number is (571) 272-3095. The examiner can normally be reached on M-F 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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